

A New Species of the Genus *Foetorepus* (Callionymidae) from Southern Japan with a Revised Key to the Japanese Species of the Genus

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Abstract A new dragonet, *Foetorepus masudai*, is described from southern Japan. This is the species that Nakabo (1983) mistakenly identified as *Foetorepus delandi*. It is characterized by large eye, filamentous 1st dorsal spine in adult males, 1st dorsal fin without an obvious dark mark, a dark spot on upper origin of pectoral fin and a large dark blotch on posterior half of pelvic fin. A revised key to the species of *Foetorepus* found in Japan is included.

Nakabo (1983) recorded and described *Foetorepus delandi* (Fowler, 1943) based on the 8 female specimens collected from Mimase, Kochi Prefecture and Miya, Aichi Prefecture, Japan, but these specimens should not be identified as *F. delandi*. At that time, males of the species and females of *F. delandi* were undescribed. More recently, 4 male specimens of the species (*F. delandi* sensu Nakabo, 1983) were examined; 3 of them were collected from off Kochi Prefecture where most of the female specimens were collected. Since the male specimens of this species are different from that of *F. delandi* and other species of *Foetorepus*, I here describe it as new to science.

Additionally, a key to the species of *Foetorepus* found in Japan is revised in this paper; the previous key presented by Nakabo (1983) is useless, because the male of *F. masudai* has different characters from the female.

Proportional measurements are shown in Table 1. Methods of counts and measurements follow Nakabo (1982). One of the paratypes, FAKU 25516, and *F. altivelis*, FAKU 49343, were dissected and stained with alizarin red S for osteology.

Foetorepus masudai sp. nov.

(Japanese name: ruson-beni-teguri)

(Figs. 1, 2, 3A)

Foetorepus delandi (not of Fowler) Nakabo, 1982: 79 (listed); Nakabo, 1983: 211, fig. 6.

Foetorepus sp. Nakabo, 1984: 343, pl. 307-G, H.

Foetorepus altivelis (not of Temminck et Schlegel) Shen, 1984: 133, pl. 133, figs. 435-4a, b.

Holotype. FAKU (Department of Fisheries, Faculty of Agriculture, Kyoto University) 52494, a male,

138.4 mm in standard length, Mimase-market, Kochi City, Kochi Prefecture, coll. by H. Masuda, Oct. 20, 1972.

Paratypes. BSKU (Department of Biology, Faculty of Science, Kochi University) 30011–30013, 3 females, 152.3–156.8 mm SL, Mimase-market, Kochi City, Kochi Prefecture, coll. by F. Tameka, Apr. 26, 1980. BSKU 50005, a female, 143.6 mm SL, Mimase-market, Kochi City, Kochi Prefecture, coll. by T. Yamakawa, Apr. 10, 1980. NSMT-P (National Science Museum, Tokyo) 21030, a female, 131.4 mm SL, Mimase-market, Kochi City, Kochi Prefecture, Mar. 12–14, 1955. FAKU 25516, 25519, 2 females, 89.7–143.4 mm SL, Miya, Aichi Prefecture, Jan. 10, 1956. FAKU 102029, a male, 103.2 mm SL, Mimase-market, Kochi City, Kochi Prefecture, coll. by T. Nakabo, Feb. 9, 1976. FAKU 104233, a male, 77.9 mm SL, off Kochi Prefecture, Jan., 1960. FAKU-K 1135, 1159, a male and a female, 97.8–133.7 mm SL, Japan.

Diagnosis. Eye very large. First dorsal spine of adult males filamentous. First dorsal fin without an obvious dark mark. Upper origin of pectoral fin with a darker spot. Posterior half of pectoral fin with a large dark blotch.

Description of holotype (male). D IV-8; A 7; P₁ i+21; P₂ I, 5; C i+7+ii; VN 7+14.

Body elongate and slightly depressed. Head slightly depressed. Eye very large. Interorbital space narrow and somewhat concave. Gill-opening small, oval, placed a little before origin of 1st dorsal fin. Preopercular spine without an antrorse process at base and with an upward process on inner side; its posterior tip somewhat curved upward. Upper jaw protractile; its posterior end exceeding anterior edge of eye. A nostril without tube on each side of preorbital region. Teeth on jaws villiform in broad bands.

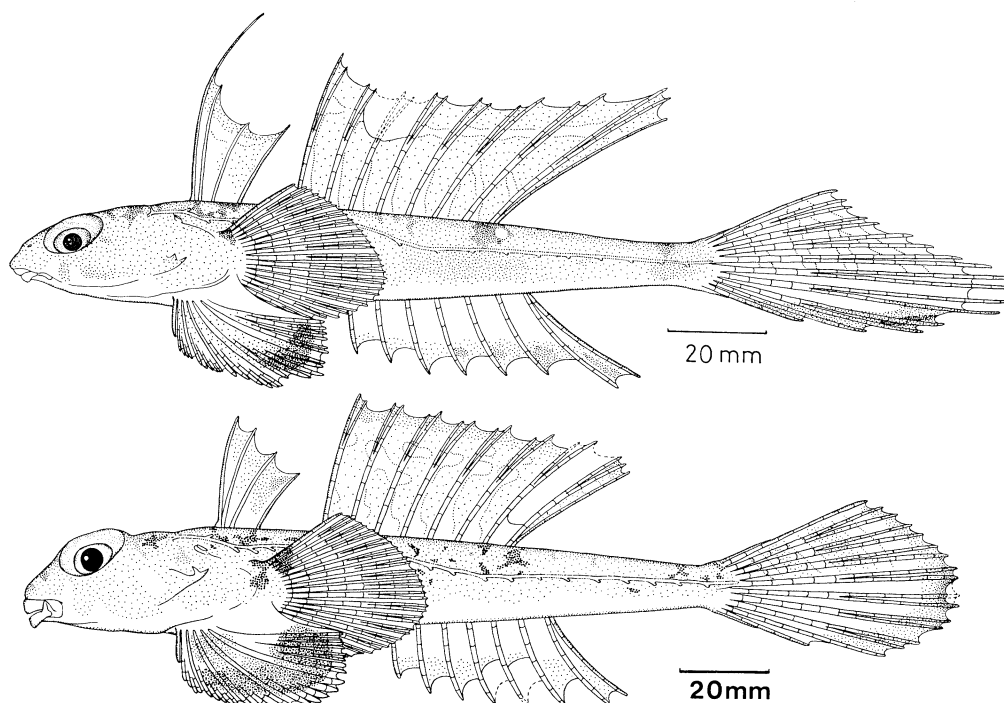


Fig. 1. *Foetorepus masudai* sp. nov. Upper, lateral view of a male, FAKU 52494, 138.4 mm SL, holotype. Lower, lateral view of a female, BSKU 30012, 152.9 mm SL, paratype (after Nakabo, 1983).

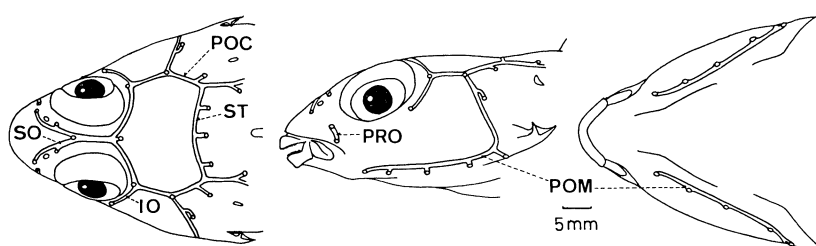


Fig. 2. Cephalic lateral line of *Foetorepus masudai*, BSKU 30011, a female, 156.6 mm SL. Left, dorsal view. Middle, lateral view. Right, ventral view. IO, infraorbital canal; POC, postocular commissure; POM, preoperculo-mandibular canal; PRO, preorbital canal; SO, supraorbital canal; ST, supratemporal canal.

Palatine and vomer toothless. Anal papilla conical. Infraorbital canal without branch, reaching posteroventral edge of eye; postocular commissure connected to preoperculo-mandibular canal (Fig. 2). Lateral line single, with very short branches downward on posterior half, reaching base of caudal fin; the line on opposite side interconnected by a transverse branch across occiput, but not on dorsal surface of caudal peduncle.

First dorsal fin not large, beginning a little behind gill-opening; 1st dorsal spine elongate and

filamentous. Dorsal rays branched distally except posterior branch of last ray divided at base; upper margin somewhat concave. Anal rays unbranched distally; last ray divided at base; length of rays increasing posteriorly. Pectoral fin rounded, reaching 5th dorsal ray. Pelvic fin rounded, not reaching 1st anal ray, and connected by membrane to middle part of pectoral fin base. Caudal fin elongate; distal margin of upper half concave, lower half convex; 5–7th rays a little filamentous.

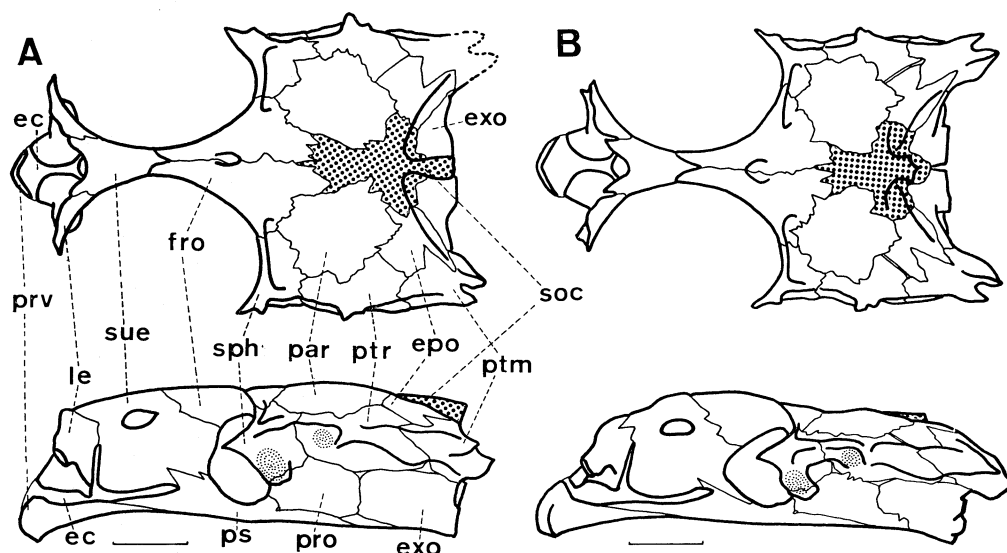


Fig. 3. The neurocranium of *Foetorepus masudai* (A) and *F. altivelis* (B). ec, ethmoid cartilage; epo, epiotic; exo, exoccipital; fro, frontal; le, lateral ethmoid; par, parietal; pro, prootic; prv, prevomer; ps, parasphenoid; ptm, posttemporal; ptr, pterotic; soc, supraoccipital; sph, sphenotic; sue, supraethmoid. Upper, dorsal view, Lower, lateral view, Scales indicate 3 mm.

Table 1. Proportional measurements as the percent of standard length in *Foetorepus masudai* sp. nov. and *F. delandi*. Data show ranges; the means and sample sizes are in parentheses.

	<i>F. masudai</i>				<i>F. delandi</i>
	Holotype		Paratypes		Paratypes
	male		young male	female	male
	1	1	2	8	2
Number of fish	1	1	2	8	2
Standard length (mm)	138.4	133.7	77.9–103.2	97.8–156.8	92.9–109.8
Body width	20.3	22.3	19.3– 21.1 (20.2, 2)	21.2– 28.6 (24.4, 8)	23.7– 25.0 (24.4, 2)
Body depth	15.5	13.9	12.3– 13.8 (13.1, 2)	12.9– 16.0 (14.8, 8)	16.0– 16.3 (16.2, 2)
Caudal peduncle depth	6.3	6.4	5.3– 5.4 (5.4, 2)	5.4– 6.0 (5.7, 8)	6.6– 6.8 (6.7, 2)
Predorsal length	27.5	26.6	27.8– 29.7 (28.8, 2)	27.7– 30.3 (28.7, 8)	32.8– 33.7 (33.3, 2)
Caudal fin length	45.1	41.2	35.4– 35.9 (35.7, 2)	32.9– 37.2 (34.8, 8)	53.1– 58.5 (55.8, 2)
Head length	26.3	25.7	28.2– 28.2 (28.2, 2)	25.8– 29.0 (27.2, 8)	30.8– 31.5 (31.2, 2)
Eye diameter	9.3	9.3	9.6– 10.8 (10.2, 2)	9.6– 11.4 (10.4, 8)	12.7– 13.5 (13.1, 2)
Snout length	7.3	7.0	7.3– 7.3 (7.3, 2)	7.1– 8.9 (7.7, 8)	7.1– 8.6 (7.9, 2)
Upper jaw length	7.4	7.8	7.8– 8.5 (8.2, 2)	7.1– 7.9 (7.6, 8)	8.6– 9.8 (9.2, 2)
Interorbital width	0.9	2.0	1.3– 2.5 (1.9, 2)	1.3– 2.6 (2.2, 8)	1.2– 2.6 (1.9, 2)
1st dorsal spine length	29.8	28.6	17.8– 20.6 (19.2, 2)	16.1– 21.5 (18.6, 8)	27.3– 30.4 (28.9, 2)
2nd dorsal spine length	16.9	18.7	17.7– 18.4 (18.1, 2)	14.2– 18.7 (15.6, 8)	25.8– 26.2 (26.0, 2)
3rd dorsal spine length	12.2	13.8	15.1– 15.5 (15.3, 2)	12.4– 17.3 (13.5, 8)	15.5– 16.8 (16.2, 2)
4th dorsal spine length	13.2	14.1	12.3– 14.3 (13.3, 2)	8.6– 12.8 (10.7, 8)	11.2– 13.6 (12.4, 2)
1st dorsal ray length	22.9	22.1	19.8– 22.4 (21.1, 2)	19.1– 20.9 (20.1, 7)	34.9– 36.7 (35.8, 2)
Last dorsal ray length	32.4	32.5	17.5– 23.5 (20.5, 2)	17.8– 20.9 (19.5, 7)	30.5– 34.6 (32.6, 2)
1st anal ray length	7.5	8.5	8.3– 8.5 (8.4, 2)	7.4– 8.5 (8.0, 8)	8.4– 8.9 (8.7, 2)
Last anal ray length	20.1	20.6	13.9– 16.9 (15.4, 2)	13.5– 15.4 (14.3, 8)	24.9– 26.0 (25.5, 2)
Pectoral fin length	21.8	22.8	20.8– 21.2 (20.9, 2)	20.1– 21.9 (21.0, 8)	25.3– 27.3 (26.3, 2)
Pelvic fin length	26.2	29.4	28.2– 28.4 (28.3, 2)	24.3– 26.6 (26.0, 8)	30.7– 31.5 (31.1, 2)
Anal papilla length	1.6	1.9	1.2– 1.4 (1.3, 2)	0.6– 1.5 (0.8, 8)	1.5– 1.8 (1.7, 2)

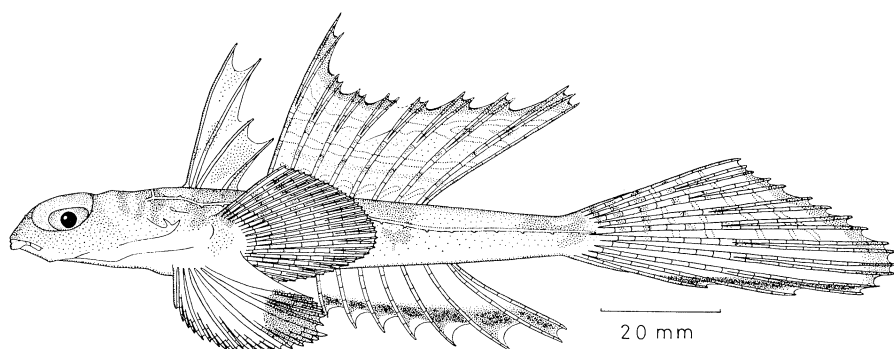


Fig. 4. *Foetorepus delandi* (Fowler). USNM 99525 (paratype), a male, 92.9 mm SL.

Neurocranium: supraoccipital crest depressed and elongate backward.

Color in life (Nakabo, 1984: pl. 307-G). Dorsal and lateral parts of body red with faint marbled darker marks; ventral part white. First dorsal fin faint yellow with red distal margin; a white line just below red distal margin. Second dorsal fin faint yellow with longitudinal white line on upper part and with a transverse white line on lower half of each membrane between rays. Pectoral fin red; upper origin of pectoral fin with a dark spot. Pelvic fin with a large dark mark on the posterior half, red on each ray. Distal margin of anal fin red. Upper half of caudal fin faint yellow with 3 oblique white lines and a broad white line near the margin; lower half with red margin.

Description of paratypes (males and females). D IV-8; A 7; P_1 i+19-21; P_2 I, 5; C i+7+ii; VN 7+14.

Eye very large. Anal papilla conical, longer in males than in females. First dorsal spine elongate and filamentous in adult males, but not in females and young males. Upper margin of 2nd dorsal fin somewhat concave in adult males, but straight in females and young males. Caudal fin more elongate in adult males, than in females and young males; distal margin of upper half concave, lower half convex and 5-7th rays a little filamentous in adult males, but round and rays not filamentous in females and young males. Supraoccipital crest in neurocranium depressed and elongate in females (Fig. 3A), like the holotype. Other characters agree well with the holotype.

Color in life of female paratype (Nakabo, 1984: pl. 307-H). Dorsal and lateral parts of body red with faint marbled darker marks; ventral

part white. First dorsal fin yellowish orange. Second dorsal fin yellow with some white mark on middle and base, and with yellowish orange distal margin. Pectoral fin red; upper origin of pectoral fin with a dark spot. Pelvic fin red with a large mark on the posterior half. Distal margin of anal fin red. Caudal fin yellow with red distal margin; upper half with 3 transverse white lines.

Color in life of young male paratype (FAKU 102029). Distal margin of 2nd dorsal fin orange. Pelvic fin red with some pinkish white circles on the middle part and with a large black mark on the posterior half. Other colorations of the young male agree well with the adult male.

Etymology. The species name, *masudai*, is derived from the name of Mr. Hajime Masuda who collected the holotype of this species.

Remarks. This new species is closely related to *Foetorepus delandi* (Fowler, 1943, from North-eastern Borneo and the Philippines), in having large eye, shape of caudal fin, lateral line on the body, a large dark mark on posterior half of pelvic fin and 1st dorsal fin without any obvious dark marks, but differs in the male from it in shape of 1st and 2nd dorsal fins, length of caudal fin, condition of 5-7th caudal fin rays, and colorations of 2nd dorsal and caudal fins (Figs. 1, 4 and Table 1). Comparison of the females of these species is impossible, as *F. delandi* females are unknown. One of the paratypes of *F. delandi*, USNM 99527, a female, 93.1 mm SL (data unknown), is not *F. delandi*; it should be identified as *Foetorepus altivelis* (Temminck et Schlegel, 1845).

Fricke (1983) considered *F. masudai* (*F. delandi* sensu Nakabo, 1983), *Foetorepus kinmeiensis* Nakabo, Yamamoto et Chen (1983) and *Foetore-*

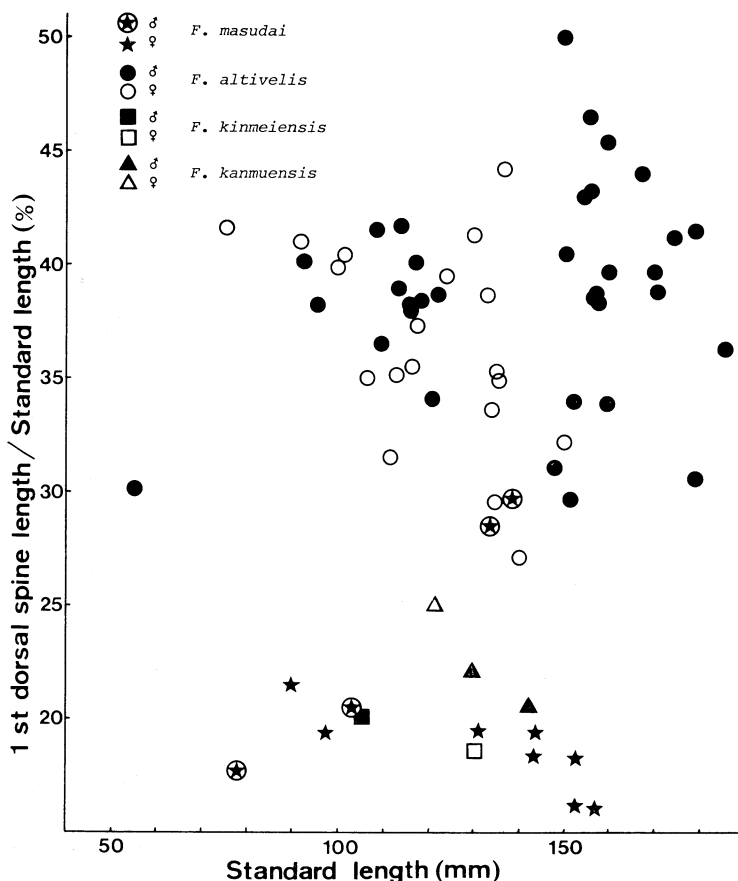


Fig. 5. Relationship between percent of 1st dorsal spine/standard length and standard length in 4 species of *Foetorepus*.

pus kanmuensis Nakabo, Yamamoto et Chen (1983) (the latter two species were collected from the Emperor Seamount Chain in the North Pacific) as synonyms for the Japanese species *F. altivelis*. He regarded the differences between *F. masudai* and *F. altivelis* as an intraspecific variation; he attributed the different fin proportions among *F. kinmeiensis*, *F. kanmuensis* and *F. altivelis* to allometric growth without actual comparison of the material. I cannot agree with his statements because of the following reasons.

Figure 5 shows the relationship between percent of the 1st dorsal spine length/standard length and the standard length of the 4 species. The 1st dorsal spine of *F. altivelis* is elongate and filamentous in adult males, females and young males; that of *F. masudai* is elongate and filamentous only in adult males; those of *F. kinmeiensis* and *F. kanmuensis* are not elongate in both sexes. In

spite of the small sample sizes, the different fin proportion of the 1st dorsal spine of the 4 species is not due to allometric growth.

Besides the 1st dorsal fin, these 4 species of *Foetorepus* differ from each other in other characters.

F. masudai is very similar to *F. altivelis* in the shape of the lateral line on the body, but differs from it in the following characters: 1) dorsal margin of 2nd dorsal fin straight in both sexes (concave in the male in the latter); 2) supraoccipital crest elongate backward (short) (Fig. 3); 3) gill-opening located before the origin of 1st dorsal fin (located behind or at the origin of 1st dorsal fin); 4) 1st dorsal fin without a dark blotch (with a dark blotch, but it is rather faint in adult males); 5) 2nd dorsal fin with longitudinal white line on upper part in males, with yellowish orange distal margin in females and young males (with several pinkish

oblique lines in both sexes). The neurocraniums of the 2 species are compared with each other in the females; the difference in the supraoccipital crest is not due to the sexuality. In addition to the above morphological differences, *F. masudai* and *F. altivelis* are collected sympatrically.

F. masudai differs from *F. kinmeiensis* in the following characters: 1) posterior tip of the preopercular spine slightly curved upward (almost straight in the latter); 2) posterior half of the lateral line with many downward very short branches (with several downward and upward short branches); 3) 1st dorsal fin without a dark blotch (with a dark blotch); 4) 2nd dorsal fin, noted above (with many undulating oblong yellow and white lines); 5) pelvic fin with a large dark mark on the posterior half (without a dark mark).

F. masudai is very similar to *F. kanmuensis* in coloration of the 1st dorsal fin and very large eye, but differs from it in the following characters: 1) distal margin of upper half of caudal fin somewhat concave (somewhat convex); 2) posterior half of lateral line, noted above (with several downward and upward short branches); 3) pelvic fin coloration, noted above (without a dark blotch).

For a comparison of *F. kinmeiensis* and *F. kanmuensis*, see Nakabo, Yamamoto and Chen (1983).

Shen (1984) showed 2 color photographs of *F. altivelis* from Northeastern coast of Formosa, but the two photographs are apparently *F. masudai*. If so, *F. masudai* is distributed in the southeast part of the East China Sea, too.

Key to the Japanese species of

Foetorepus

- A₁ Posterior half of lateral line with some upward and downward very short branches.....
.....*F. kamoharai* Nakabo
- A₂ Posterior half of lateral line with many downward very short branches.....B
- B₁ Gill-opening located behind or at the origin of 1st dorsal fin.....
.....*F. altivelis* (Temminck et Schlegel)
- B₂ Gill-opening located before the origin of 1st dorsal fin.....*F. masudai* sp. nov.

Comparative material examined. *F. delandi*: USNM (National Museum of Natural History, Smithsonian Institution) 99525 (paratype), a male, 92.9 mm SL,

Point Tagolo Light, (Mindanao, Philippines), 8°46'N, 123°32'30"E, 175 fms, Aug. 9, 1909; USNM 99526 (paratype), a male, 109.8 mm SL, Point Tagolo Light, 8°48'N, 123°31'E, 200 fms, Aug. 9, 1909. *F. altivelis*: FAKU 49343, a female, 136.8 mm SL, Mimase-market, Kochi Prefecture, Feb. 10, 1976: specimens shown in p. 208–209 of Nakabo (1983). *F. kinmeiensis* and *F. kanmuensis*: specimens shown in p. 349 and 351–352 of Nakabo, Yamamoto and Chen (1983).

Acknowledgments

I wish to thank Mr. Hajime Masuda at Tokai University who gave me the material for the holotype, Dr. Osamu Okamura, Mrs. Fusa Tameka at Kochi University and Mr. Takeshi Yamakawa at Kochi Senior High School who loaned the materials of BSKU for the paratypes, and Dr. Victor G. Springer at USNM who gave me the chance to examine the paratypes of *F. delandi* for comparison.

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南日本沿岸から採集されたネズッポ科の新種ルソンベニ
テグリと日本産ベニテグリ属の種の検索の改訂

中坊徹次

本種は、Nakabo (1983) がフィリピン諸島とボルネオ北部沿岸原産の *Foetorepus delandi* (Fowler) と同定し、ルソンベニテグリという和名を与え、日本初記録種として報告したものと同一である。Nakabo (1983) の誤同定を改め、新種 *Foetorepus masudai* としてここに記載した。本種の標本は、南日本沿岸（高知県御豊瀬、愛知県三谷）から得られたものである。御豊瀬では沖合

底びき網で採集されているので、生息場所は大陸棚縁域である。

本種の形態的特徴は、1) 眼が大きい；2) 雄の背鰭第1棘は長く糸状に伸びる；3) 第1背鰭には、はっきりした褐色斑がない；4) 胸鰭起部上部には1褐色斑点がある；5) 腹鰭後半部には1大褐色斑紋がある、等である。

Nakabo (1983) の与えた日本産ベニテグリ属の種の検索は不十分となったので、改訂したものを提示した。

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